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AUTHOR Jacobs, James
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ABSTRACT

Trends in the workplace and legislative mandates have forced community colleges to consider how to integrate general education with vocational training successfully. The technological base of American industry has changed dramatically in the direction of greater complexity and interdependence, requiring workers to possess not only higher levels of basic skills but also new skills in critical thinking, problem solving, initiative, and collaboration. The following principles can guide the integration of general education and vocational training: (1) the critical thinking skills that come from the general education curriculum are central to the successful implementation of new technologies and the understanding of how technologies fit into production strategies; (2) instruction in basic skills is necessary if workers are to compute, deduce, and communicate answers to on-the-job problems; (3) the ability to learn, grow, change, and transfer skills is increasingly required in the workplace; (4) workers must be able to integrate basic skills with the shifts in workplace and market demands; (5) community college vocational faculty need to relearn and update their own knowledge and skills; and (6) workers need to expand their skills to include information gathering, analytical and critical thinking, and decision making. The result of integrating general and vocational education will be workers with higher skills, paid higher wages, and able to compete in the global economy. Community colleges are challenged to redesign their vocational programs, drawing upon their expertise in general education, to respond to the changing workplace needs. (ECC)

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VOCATIONAL AND GENERAL EDUCATION: NEW RELATIONSHIP OR SHOTGUN MARRIAGE?

James Jacobs

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There is general agreement among community college educators on the importance of developing better linkages between vocational and academic education. External forces have effectively required better integration of the two once-separate domains. The Carl D. Perkins Vocational and Applied Technology Act of 1990, the major federal legislation that defines and organizes vocational education, actually mandates that all states measure vocational students' progress in achieving both basic and advanced academic skills. Perhaps an even more important force for change has been the changing skill needs of American business and industry.

Workplace Skills Needed in the New Era

In the past decade, higher education has increasingly been called upon to serve the needs of business and industry, primarily by providing needed employee training. This is not a new development, as colleges and universities have responded to calls for closer ties to the world of work since the mid-nineteenth century. What is new this time is the provision of training for those already employed by business and industry as well as for new entrants into the work force. Also new to the discussion is the realization that not only has the absolute magnitude of employee skills deficits and the corresponding need for education and training increased, but so too has the qualitative nature of the skills needed by a rapidly changing economy.

Essentially, the technological base of American industry has changed dramatically, and these changes—nearly all in the direction of greater complexity and interdependence—require workers who possess not only higher levels of basic skills but also new skills in critical thinking, problem solving, initiative, and collaboration. Not only does the manufacturing sector require workers who can read, write, cipher, and operate complex, computer-controlled machinery, but also workers who understand the interrelationship of manufacturing processes and who can respond to problems involving systems outside of their immediate areas of responsibility.

The fast-paced development of new technologies has forced business and industry to invest heavily in retraining its present work force. Community colleges throughout the nation have responded by providing training and education customized to meet the specific needs of local employers. This growth of customized training has challenged traditional notions of vocational education by focusing on adult workers, who possess a range of job skills and life experiences. Conventional vocational programs were designed for youth entering the work force, and most were aimed at providing specific job-related technical skills.

However, the distinction between training and education has blurred as business and industry demand both job-specific training and general skills that can be applied in a variety of technical areas. Trends in the workplace have forced colleges to consider carefully how they might successfully integrate general education with vocational training.

Principles for Integrating Education and Training

The following are principles to guide the integration of general education into vocational curricula.

Critical Thinking. First, the critical thinking skills that come from the general education curriculum are central to the successful implementation of new technologies. Course components need to deal with problems of implementing technologies, as well as with the skills associated with operating them. The example of computer-automated design (CAD) is illustrative. The conventional vocational program teaches skills that permit an individual to operate a piece of equipment or set of interrelated equipment. For instance, one can learn to be a CAD operator at most community colleges and develop sufficient skills to perform most two-dimensional drawings. However, if a firm is to realize significant productivity gains from CAD, workers must have an understanding of how the process can be applied to making libraries of parts, to storing and manipulating CAD-generated information, and to passing those data to other machines such as cutting tools. These needs make it incumbent that the CAD operator understand how the technology fits within the production strategy of the firm, a topic that too few CAD courses now cover.

Basic Skills. Second, instruction in basic skills needs to be part of any vocational education program. New manufacturing technologies call for more attention to the use of basic skills to compute, deduce, and communicate answers to problems. Teaching in many vocational education classes is based on repetition and observation of others, and this can be effective for training job-specific skills. However, such instruction needs to be

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coupled with teaching strategies that have been proven effective in helping students develop basic skills. Subjects such as mathematics and communications should not be segregated from vocational education programs but need to be designed as core components of any vocational curriculum. Instructional strategies need to be appropriate to the intended learning outcomes.

Learning to Learn. The ability to grow and change is increasingly required in the workplace. Transferable skills are especially important because the applications of new manufacturing technologies to particular problems are extremely diverse. For instance, there is no one way to implement computer numerical control. In some firms, the programming of the machine is undertaken by the engineering department, far removed from the shop floor. In others, program adjustments are made by the operator of the equipment. For firms to realize the flexibility that computer-based technologies can bring to the workplace, workers need both broad general skills and the ability to learn and apply their skills to a variety of contexts in the workplace.

In 1985, the Committee for Economic Development, a national association of business groups, foreshadowed current criticism of conventional models of vocational education: "Business in general is not interested in narrow vocationalism... Employers would prefer a curriculum that stresses literacy, mathematical skills, and problem-solving skills; one that emphasizes learning how to learn and adapting to change."

Ability to Adapt to Job Changes. Workers must be able to integrate basic skills with the shifts in workplace and market demands. New manufacturing technologies decrease the amount of direct labor involved in manufacturing, but they raise the demand for associated work. The repair and maintenance function, for example, becomes more critical, and many tasks related to software development, positioning of machine vision systems, and quality control of operations have become more important. All of these tasks are performed by skilled workers, often those upgraded from production work. The challenge to vocational educators is to develop programs that train workers in the skills necessary to advance along the "labor queue." Career advancement requires workers to be able to apply their skills to a variety of tasks and to learn new jobs as they emerge in the workplace. Such adaptability needs to be an outcome of all community college vocational programs.

Updating of Vocational Faculty. Community college vocational faculty need to relearn and update their own knowledge and skills. New manufacturing technologies challenge vocational educators not only to update their equipment, but also to update their faculty. Most community colleges vocational faculty received their training in the premicrocomputer era, and unless adequate staff development programs have been provided, they have probably lagged behind the development of technology.

Equally significant, faculty tend to approach technical training as one would teach skills to inexperienced youth. However, training that might be appropriate for an eighteen year-old just out of high school and looking for a trade is often unsuitable for adults in their midthirties, most of whom already have jobs and attend class in the evenings. These learners each have a work history, family, and context around which good technical training must be built. In short, adult students need to be taught in a style that can draw upon their skills, and colleges need to develop the teaching skills of their vocational faculty to deal more effectively with adults.

Higher-Level Decision Making Skills. Workers need to expand their skills to include information gathering, analytical and critical thinking, and decision making. The introduction of new technology is associated with the broader issue of organizational change. Corporations are moving away from an era of mass production to one of specialization and marketing. Thus, the principal strength of a business organization is not the ability to realize economies of scale and produce cheaper goods than its competitors, but rather skill in recognizing trends in the market and quickly responding with targeted products and services. For example, a successful automobile company does not design cars for the general American family but rather, based on marketing information, for different segments of that family. The reason that Japanese automobile makers have done so well in the United States is not because their costs are lower but because they have geared their production strategies to make quick product adjustments to meet changing consumer tastes.

This emphasis on flexibility and quick responses to the marketplace alters the skills necessary for success. Information gathering, analytical and critical thinking skills, and decision making take on heightened importance, not only for the top management of the company but for all levels of the organization. Indeed, successful firms build less hierarchical organizations and strive to bring decision making close to the production process. The skills that are necessary to provide leadership for the company are the same as those needed on the shop floor. Not only are higher levels of work skills required, but such skills are the outcome of a general education more than of narrow vocational training.

Vocational education in the nation's schools and colleges is undergoing a major transformation. As process skills become more critical in the workplace than job-specific knowledge, vocational educators are being forced to seek ways to integrate general education into their programs. The result will be workers with higher skills, paid higher wages, and able to compete in the global economy. The challenge for community colleges is to redesign their vocational programs, drawing upon their expertise in general education, to respond to the changing needs of the American workplace.

James Jacobs is director of policy research at Macomb County Community College, Warren, Michigan, and former senior researcher for the Industrial Technology Institute, Ann Arbor. This piece is abstracted from an article of the same name in New Directions for Community Colleges, no. 81, Spring 1993, published by Jossey-Bass.

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